Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Implementation of Section 224 of the Act;	)	WC Docket No. 07-245
Amendment of the Commission's Rules and	)	
Policies Governing Pole Attachments	)	RM-11293
	)	
	)	RM-11303

Declaration of Michael Roberts in Support of Comments of Ameren Services Company and Virginia Electric and Power Company

1. My name is Mike Roberts and I am employed by Virginia Electric and Power Company d/b/a Dominion Virginia Power ("Dominion"). I have a Bachelor of Science Degree in Engineering Technology - Civil from Old Dominion University. I have been employed by Dominion for 28 years.

2. As the Lead Joint Use Administrator for Dominion, I have worked in the area of pole attachments and joint use for 11 years. During that time, I have overseen and managed numerous pole attachment and joint use relationships and worked with dozens of communications companies that either requested to make attachments or did make attachments to Dominion's poles, ducts conduits and rights-of-way. There are over 2 million Dominion customers throughout a 32,000 square mile service territory in Virginia and North Carolina. Overall, this territory includes 1,501,657 total poles and over 700,000 attachments by communications companies.

3. Although there are 718,755 attachments (312,095 cable, 100,454 Telcom, 297,206 ILEC) Dominion's 967,305 poles by over 35 different communications companies, there are virtually no remaining attachments used to provide solely cable service or strictly

telecommunications service. The only company I am aware of which provides solely such specific services is CWA cable (328 attachments).

4. The overwhelming majority of attachments are used to provide some form of "Broadband Service." Virtually all attachments by cable companies, such as Cox, Comcast and Charter, offer not only traditional video service, but also cable modem Internet access and telephony service, whether circuit switched or packet switched.

5. Attachments by telecommunications companies, such as Verizon, AT&T and Cavalier Telephone, are used to offer and provide Internet access service through Digital Subscriber Line ("DSL") service. In addition to DSL service, many telecommunications companies also offer video service.

6. Wireless communications companies such as Sprint-Nextel, T-Mobile and AT&T also offer Broadband Service. Whether these companies are major wireless carriers, such as T-Mobile, that offer Internet access in conjunction with data and voice service, or smaller companies which offer solely Internet access service through technologies such as WiFi or WiMax, they virtually all offer Broadband Service.

7. Although the Broadband Service providers discussed above sometimes provide their customers only one form of Broadband Service, based on advertising I have seen, most offer their customers very similar packages of bundled services consisting of Internet access, telephony, video service and video programming. This technological, functional and business convergence indicates that one "Broadband Attachment Rate" would be sensible.

8. The 2008 rental rate for attachments to Dominion's facilities used to provide solely cable service is $6.08.

9. The 2008 rental rate for attachments to Dominion's facilities used to provide telecommunications service is $15.67. The average number of attachments on Dominion's facilities used to calculate the telecommunications attachment rate is 2.6. This average number was determined by a statistical survey performed for us by a consultant in 2001.

10. In light of the technological, functional and business convergence described in my Declaration, it is impossible for me or anyone at Dominion to determine what type of signals, information or data is being carried across any attachment. It also should not matter. A single Broadband Attachment Rate based on a fair allocation of the value of the pole to the Broadband Service Provider would go a long ways towards resolving the disputes between pole owning electric utilities and attaching entities.

11. Attaching entities have traditionally seen pole owners as impeding the deployment of their communications networks while pole owners have viewed the attaching companies as jeopardizing critical infrastructure. These opposing views and the resulting difficulties in pole attachment relations are in part an unavoidable result of the current legal framework, which mandates access at differing rates for different types of companies, despite that none of the rates fully compensates electric ratepayers for the attaching entities' use of the ratepayers' infrastructure.

12. If the FCC established a single Broadband Attachment Rate such as the one described below, disputes over the classification of attachments would be nearly totally eliminated and pole owning utilities and attaching entities would likely work together in a more economically viable and business-like approach in the context of an infrastructure partnership.

13. Because a fair and equitable allocation of financial responsibility for the total pole space benefiting all attached parties would resolve many concerns, Dominion and I have

developed an approach for such an allocation, termed Proportionate Allocation Rate ("PAR"). The PAR approach is based on both the rate formula established by the State of Maine in its pole attachment regulations and Dominion's comprehensive data analysis of its pole plant.

14. Dominion's data establishes that on average, the pole owning electric utility uses on average 34.36% of the space on the pole. 24.46% of the space on the pole is used by the Incumbent Local Exchange Carrier/Joint Use partner and 20.59% of the space on the pole is used by other attaching communications companies, whether Competitive Local Exchange Carriers, wireless carriers, or municipal or local governmental attachers. This allocation includes all of what the FCC has termed "useable" and "unuseable" space. Communications companies use and benefit from not only the "communications space" but also the "power space," the top of the pole and all of the "common space" that supports and allows for the pole attachments. The PAR is based on data and the resulting presumption that on each pole there is one attachment by the pole owner, one attachment by the Joint Use partner and one attachment by each of two Broadband Service Providers.

15. In an example of the PAR, by using the FCC formula for 2008 the bare pole cost is $244.14 and the annual carrying charges were 33.64%. The costs to be allocated under the PAR would then be $82.12 per year. The pole owner would pay $28.22 (34.36% of $82.12), the joint user would pay $20.09 (24.46% of $82.12) and each Broadband Service Provider would pay $16.91 (20.59% of $82.12).

I declare under penalty of perjury that the information and statements contained in this Declaration are true and correct.

Michael C. Roberts

Michael C. Roberts

3/06/2008

Date

Attachment 2

Before the
FEDERAL COMMUNICATIONS COMMISSION
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Implementation of Section 224 of the Act;	)	WC Docket No. 07-245
Amendment of the Commission's Rules and	)	
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	)	
	)	RM-11303

Declaration of Scott Liebel, PE in Support of Comments of Ameren Services Company and Virginia Electric and Power Company

1. My name is Scott Liebel and I am employed by Union Electric d/b/a AmerenUE as Manager, Joint Use Assets. I have a Bachelor of Science Degree in Civil Engineering from University of Missouri at Rolla. I am a licensed professional engineer in the states of Missouri and Illinois. I have been employed by AmerenUE for 26 years.

2. In my role for AmerenUE, I have worked in the area of pole attachments and joint use for 7 years. During that time, I have overseen and managed hundreds of pole attachment and joint use relationships and worked with dozens of communications companies that either requested to make attachments or did make attachments to AmerenUE's poles, ducts conduits and rights-of-way. In addition to managing all pole attachment and joint use matters for AmerenUE in the State of Missouri, I manage pole attachments and joint use matters for Ameren Corporation's other operating companies in the State of Illinois. Together, Ameren's four operating companies serve over 2.3 million customers throughout a 64,000 square mile service territory in Missouri and Illinois. Overall, this territory includes 2.1 million poles and over 1.2 million attachments by communications companies, including ILECs.

3. AmerenUE has over 800,000 poles in Missouri. Although there are over 450,000 attachments to AmerenUE's poles by over 40 different communications companies, there are virtually no remaining attachments used to provide solely cable service or strictly telecommunications service. The only companies I am aware of which provide solely such specific services are Sho-Me Technologies, Lightcore, and the School District of Washington.

4. The overwhelming majority of attachments are used to provide some form of "Broadband Service." Virtually all attachments by cable companies, such as Charter Communications, Comcast and Mediacom, offer not only traditional video service, but also cable modem Internet access and telephony service, whether circuit switched or packet switched.

5. Attachments by telecommunications companies, such as AT&T, are used to offer and provide Internet access service through Digital Subscriber Line ("DSL") service. In addition to DSL service, many telecommunications companies also offer video service.

6. Wireless communications companies such as Sprint and AT&T also offer Broadband Service. Whether these companies are major wireless carriers, such as AT&T, that offer Internet access in conjunction with data and voice service, or smaller companies such as Network1 Communications, which offer solely Internet access service through technologies such as WiFi or WiMax, they virtually all offer Broadband Service.

7. Although the Broadband Service providers discussed above sometimes provide their customers only one form of Broadband Service, based on advertising I have seen, most offer their customers very similar packages of bundled services consisting of Internet access, telephony, video service and video programming. This technological, functional and business convergence indicates that one "Broadband Attachment Rate" would be sensible.

8. The 2007 rental rate for attachments to AmerenUE's facilities used to provide solely cable service is $11.50.

9. The 2007 rental rate for attachments to AmerenUE's facilities used to provide telecommunications service is $35.22. The average number of attachments on AmerenUE's facilities used to calculate the telecommunications attachment rate is 2.2. This average number was determined by field audits of AmerenUE's pole plant.

10. In light of the technological, functional and business convergence described in my Declaration, it is impossible for me or anyone at AmerenUE to determine what type of signals, information or data is being carried across any attachment. It also should not matter. A single Broadband Attachment Rate based on a fair allocation of the value of the pole to the Broadband Service Provider would go a long ways towards resolving the disputes between pole owning electric utilities and attaching entities.

11. Attaching entities have traditionally seen pole owners as impeding the deployment of their communications networks while pole owners have viewed the attaching companies as jeopardizing critical infrastructure. These opposing views and the resulting difficulties in pole attachment relations are in part an unavoidable result of the current legal regime, which mandates access at differing rates for different types of companies, despite that none of the rates fully compensates electric ratepayers for the attaching entities' use of the ratepayers' infrastructure.

12. If the FCC established a single Broadband Attachment Rate such as the one described in the Declaration of Mike Roberts, disputes over the classification of attachments would be nearly totally eliminated and pole owning utilities and attaching entities would likely

work together in a more economically viable and business-like approach in the context of an infrastructure partnership.

I declare under penalty of perjury that the information and statements contained in this Declaration are true and correct.

Scott Liebel

Scott Liebel

3/7/08

Date

Reports of
Joint General Committee
of
Edison Electric Institute
and
Bell Telephone System
on
Physical Relations Between Electrical Supply and Communication Systems

REISSUED
JULY 1945

Additional copies of this report may be obtained by Power Companies from the Edison Electric Institute (Publication No. M5) and by Associated Bell Companies from the Department of Operation and Engineering of the American Telephone and Telegraph Company.

Attachment 3

REPORTS OF
JOINT GENERAL COMMITTEE
of
EDISON ELECTRIC INSTITUTE
and
BELL TELEPHONE SYSTEM

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PRINTED IN U. S. A.

JOINT GENERAL COMMITTEE
OF
EDISON ELECTRIC INSTITUTE
AND BELL TELEPHONE SYSTEM

New York, July 9, 1945.

MEMBER COMPANIES OF E.E.I.

ASSOCIATED COMPANIES OF BELL SYSTEM:

For a number of years the following reports of the Joint General Committee of the NELA and Bell Telephone System have formed a satisfactory basis for the coordination of the electrical facilities of electric supply companies and communication facilities of the Bell System.

Principles and Practices for the Inductive Coordination of Supply and Signal Systems — December 9, 1922.

Principles and Practices for the Joint Use of Wood Poles of Supply and Communication Companies — Feb. 15, 1926.

Allocation of Costs Between Supply and Communication Companies — October 15, 1926.

The supply of copies of the original issue of these reports has been exhausted and accordingly they have been reprinted. In this reissue the three reports have been included under a single cover. A few editorial changes have been made which involve no change in substance.

H. B. Bryans

W. H. Sammis

E. C. Stone

Edison Electric Institute Representatives

M. R. Sullivan

K. S. McHugh

Bell System Representatives

JOINT GENERAL COMMITTEE

FOREWORD

The Principles and Practices which are now being reissued under a single cover have, during the past two decades, contributed greatly to the successful operations of the power and telephone industries, and because they have promoted cooperation between these industries, they have benefited the general public. It seems appropriate in connection with this reissue to review the development of these Principles and Practices however, for brevity, omitting mention of all but the original organization.

Previous to 1921, structural and inductive interference problems were giving rise to increasing numbers of controversies between Bell Telephone Companies and Power Companies throughout the country. Early in 1921, therefore, a group of power and telephone men met to discuss the possibilities of a basis for an engineering solution of the problems concerned. Mr. Owen D. Young presided at that meeting and there was formed the Joint General Committee of the National Electric Light Association and Bell Telephone System with the following membership:

Messrs. O. D. YOUNG, *Chairman*,
General Electric Company,

R. H. BALLARD,
Southern California Edison Company,

M. R. BUMP,
H. L. Doherty & Company,

H. M. BYLLESBY, Represented by R. F. Pack,
H. M. Byllesby & Company,

J. J. CARTY,
American Telephone and Telegraph Company,

BANCROFT GHERARDI,
American Telephone and Telegraph Company,

E. K. HALL,
American Telephone and Telegraph Company,

L. H. KINNARD,
The Bell Telephone Company of Pennsylvania,

MARTIN J. INSULL,
Middle West Utilities Company,

ROBERT LINDSAY,
Cleveland Electric Illuminating Company,

BEN S. READ,
The Mountain States Telephone and Telegraph Company,

PAUL SPENCER,
United Gas Improvement Company,

GUY E. TRIPP,
Westinghouse Electric & Manufacturing Company,

M. H. AYLESWORTH, *Secretary*,
National Electric Light Association,

Messrs. Bump, Pack and Gherardi were designated as an Engi-

neering Subcommittee representing both interests with instructions to classify the types of situations in which engineering or technical conflicts were arising. They selected a committee of engineers whose instructions were to proceed with a classification of the types of problems concerned under two divisions (a) those for which a standard had been accepted by both parties and (b) those for which there were no existing standards. Their further instructions were to approach the various problems in the broadest possible spirit of cooperation, with the double objectives of the removal of causes of friction and the early development of mutually satisfactory practices. This committee of engineers consisted of Messrs. H. P. Charlesworth, S. P. Grace, H. S. Osborne and H. S. Warren, representing the Bell Telephone System and Messrs. W. J. Canada, A. E. Silver and F. H. Lane, representing the NELA. Mr. H. L. Wills later succeeded Mr. Canada.

The Engineering Subcommittee in its first report found that the National Electrical Safety Code provided an acceptable guide to practice for problems involving crossings, conflicting construction and jointly occupied poles, and recommended, as to parallel construction, general principles pointing the way to the satisfactory solution of specific cases. After further work the subcommittee prepared the more comprehensive reports which are generally known as the Principles and Practices, and which with minor editorial changes are reproduced in this booklet.

Early in its work the Engineering Subcommittee found that there was need for mutually acceptable technical data to aid in the solution of both electrical and structural coordination problems. Accordingly, the Joint Subcommittee on Development and Research was organized in 1923. Its factual reports have greatly facilitated the solution of coordination problems by the power and telephone companies and have enabled them to arrive at sound engineering answers to the new problems which have accompanied advances in the power and communication arts.

FOR THE
INDUCTIVE COORDINATION OF SUPPLY AND COMMUNICATION SYSTEMS

Scope.

These principles and practices are intended to apply to all new installations, extensions and reconstructions and to the maintenance, operation and changes of all communication and supply systems where inductive coordination may be required now or later to prevent interference with the rendering or providing of supply or communication service.

PRINCIPLES

Duty of Coordination.

(a) In order to meet the reasonable service needs of the public, all supply and communication circuits with their associated apparatus should be located, constructed, operated and maintained in conformity with general coordinated methods which maintain due regard to the prevention of interference with the rendering of either service. These methods should include limiting the inductive influence of the supply circuits or the inductive susceptiveness of the communication circuits or the inductive coupling between circuits or a combination of these, in the most convenient and economical manner.

(b) Where general coordinated methods will be insufficient, such specific coordinated methods suited to the situation should be applied to the systems of either or both kinds as will most conveniently and economically prevent interference, the methods to be based on the knowledge of the art.

Cooperation.

In order that full benefit may be derived from these principles and in order to facilitate their proper application, all utilities between whose facilities inductive coordination may now or later be necessary, should adequately cooperate along the following lines:

(a) Each utility should give to other utilities in the same general territory advance notice of any construction or change in construction or in operating conditions of its

facilities concerned, or likely to be concerned, in situations of proximity.

(b) If it appears to any utility concerned that further consideration is necessary, the utilities should confer and cooperate to secure inductive coordination in accordance with the principles set forth herein.

(c) To assist in promoting conformity with these principles, an arrangement should be set up between all utilities whose facilities occupy the same general territory, providing for the interchange of pertinent data and information including that relative to proposed and existing construction and changes in operating conditions concerned or likely to be concerned in situations of proximity.

Choice Between Specific Methods.

When specific coordinated methods are necessary and there is a choice between specific methods, those which provide the best engineering solution should be adopted.

(a) The specific methods selected should be such as to meet the service requirements of both systems in the most convenient and economical manner without regard to whether they apply to supply systems or communication systems or both.

(b) In determining what specific methods are most convenient and economical in any situation for preventing interference, all factors for all facilities concerned should be taken into consideration including present factors and those which can be reasonably foreseen.

(c) In determining whether specific methods, where necessary, shall be wholly by separation or partly by methods based on less separation, the choice should be such as to secure the greatest present and future economy and convenience in the rendering of both services.

Inductive Coordination for Existing Construction.

(a) Utilities operating supply or communication circuits should exercise due diligence in applying coordinated methods, as occasion may rise, in accordance with these principles, to existing construction.

(b) When supply or communication circuits are generally reconstructed, or when associated apparatus is rearranged or added, or when any change is made in the arrangement or characteristics of circuits, the new or changed parts should be brought into conformity with these principles.

Coordinated Locations for Lines.

Utilization of the highways is essential to the economical and efficient extension, operation and maintenance of supply and communication facilities. To avoid unduly increasing the number or difficulty of situations of inductive or other exposure incident to the use of the same highway by two different kinds of facilities, all lines should, in general, be located as follows:

(a) GENERAL LOCATION.

(1) Where the conditions and character of the circuits permit, joint use of poles by communication and supply circuits is generally preferable to separate lines when justified by considerations of safety, economy and convenience, and presuming satisfactory agreement between the parties concerned as to terms and conditions.

(2) Where communication circuits and supply circuits on the same highway are not to occupy joint poles or where either kind of circuit is alone on a highway, all communication circuits should be placed on one side of the highway and all supply circuits should be placed on the other side, so that, as far as practicable, one side of any section of a highway will be available as the communication side and one side as the supply side.

(3) Unnecessary crossings from side to side of the highway should be avoided.

(b) DETAILED LOCATION.

(1) Local Communication Lines.

Where to be located on the same highway with local supply lines, joint use is generally preferable to separate lines, except sometimes in rural districts and except where the character of circuits involved makes separate lines on opposite sides of the highway more desirable.

Where to be located on the same highway with transmission lines, separate lines on opposite sides of the highway are generally preferable unless a large number of service wire crossings would be involved, in which case, joint use or other arrangements may be preferable.

(2) Toll or Through Communication Lines.

Where to be located on the same highway with local supply lines or lower voltage transmission supply lines, separate lines on opposite sides of the highway are generally preferable, unless a large number of service wire crossings would be involved, in which case, joint use or other arrangements may be preferable.

Where proposed for location on the same highway or to follow the same general direction with higher voltage transmission supply lines, cooperative consideration should determine whether such locations should be used, and if so, what specific coordinated methods are necessary. Where to be located on the same highway with higher voltage transmission supply lines, separate lines on opposite sides of the highway are preferable.

(3) Local Supply Lines.

Where to be located on the same highway with local communication lines, joint use is generally preferable to separate lines except sometimes in rural districts and except where the character of circuits involved makes separate lines on opposite sides of the highway more desirable.

Where to be located on the same highway with toll or through communication lines, separate lines on opposite sides of the highway are generally preferable, unless a large number of service wire crossings would be involved, in which case, joint use or other arrangements may be preferable.

(4) Transmission Supply Lines.

Where to be located on the same highway with local communication lines or shorter toll or shorter trunk communication lines, separate lines on opposite sides of the highway are generally preferable unless a large number of

service wire crossings would be involved, in which case, joint use or other arrangements may be preferable.

Where proposed for location on the same highway or to follow the same general direction with longer toll or through communication lines, cooperative consideration should determine whether such locations should be used and if so, what specific coordinated methods are necessary. Where to be located on the same highway with longer toll or through communication lines, separate lines on opposite sides of the highway are preferable.

(5) Avoidance of Overbuilding.

Overbuilding of one line by another should be avoided, where practicable. Where necessary for the two kinds of lines to occupy the same side of a highway, joint use is generally preferable to overbuilding.

(c) Other Rights of Way.

The foregoing principles, although specifically mentioning highways, should also, when applicable, govern situations involving private rights of way near to each other or to highways.

Deferred General Coordination.

While communication or supply lines when alone should conform to general coordinated methods, such lines, pending the incoming or development of the other kinds of lines, may, if deemed economically advantageous, occupy locations or use types of facilities, construction and operating methods other than those conforming to general coordinated methods. However, the location and character of such facilities should be altered when and as necessary to conform to these methods upon the incoming or development of another kind of facility conforming to general coordinated methods.

Special Location and Types.

When coordination of supply and communication lines of particular types cannot be technically and economically established under the methods of coordination covered by these principles, special cooperative consideration should be given to determining what location and type of construction should be established for each line of such type.

PRACTICES

Introductory.

These recommended practices supplement, and are intended to be in accord with, the principles given in the foregoing. They are based on experience, and their application, in connection with the principles on "Coordinated Location of Lines" will effectively promote the inductive coordination of supply and communication systems.

In the development of these detailed practices, it has been found advisable to proceed step by step along two well defined subdivisions, namely, practices based on qualitative considerations, and those based on quantitative values. The practices given herewith cover qualitative considerations and form a basis for the later adoption of definite quantitative values where they may properly apply. It is recognized that in the growth and development of the respective utilities and as the development of the art progresses, other satisfactory methods will doubtless be devised. The fact that particular methods are specified herein does not preclude the use of other mutually satisfactory methods, nor their incorporation in these practices as they may be agreed upon.

In order that the above considerations may be carried out it is intended that the joint work on practices will be continued and that additional material will be issued from time to time as it becomes available. In the preparation of these practices, certain factors were encountered which, due to lack of complete information, could not be as fully covered at this time as their importance in inductive coordination merits. Among these factors are included certain features of the protection of communication systems, the selectivity of communication apparatus, the transposing of supply circuits outside of inductive exposures and the question of single versus multiple grounding in supply systems.

In order that the full intent of the principles may be carried out, the practices hereinafter specified as "General Coordinated Methods" should be applied to all communication and supply systems, except as deviations may be made under the principle of "Deferred Coordination." In cases of inductive exposure, where these general coordinated methods are insufficient, such of the practices hereinafter specified as "Specific Coordinated

Methods" should, in addition, be applied as will provide the best engineering solution.

MUTUALLY APPLICABLE PRACTICES

Notice and Cooperation.

Utilities between whose facilities inductive coordination is, or later may become, necessary should each give to the other advance notice of any construction or changes in construction or operation of their respective facilities. The utilities should cooperate in determining and carrying out those methods which provide the best engineering solution in each case, and to this end there should be complete interchange of information.

Limitation of Influence and Susceptiveness.

In designing, specifying or otherwise determining the location, construction and arrangement of supply or communication circuits or the quality, arrangement and suitability of materials or apparatus to be used in, or associated with, communication or supply circuits and in operating and maintaining lines and apparatus, all factors which would contribute to inductive influence or inductive susceptiveness during either normal or abnormal conditions should be limited in so far as is necessary and practicable.

Changes in Systems or Methods.

In changing systems or methods of operation, precaution should be taken to avoid increasing, and an effort made to decrease, if practicable, the influence or susceptiveness. Any abnormal condition which increases these factors should be promptly remedied. If the service requirements prevent a prompt remedy of such condition, effort should be made to reduce these effects by such other methods as are available.

Operating Instructions.

Communication companies should adopt operating instructions, specifically outlining the procedure for notification of supply companies when inductive disturbances arise on toll circuits that appear to be incidental to abnormal power influence and supply companies should adopt operating rules which outline the desirable procedure for their operators during times when a supply circuit is abnormally unbalanced.

Records.

A record should be kept by the communication companies of disturbances on communication circuits, and the supply companies should keep a record of accidental or transient conditions on supply circuits, so that a study of such disturbances which appear to be due to accidental or transient conditions will be facilitated.

Mechanical Construction.

The mechanical design and construction of communication and supply systems should conform to good modern practice.

Maintenance.

Efforts should be made to anticipate and forestall failure of lines or equipment. Defective equipment should not be continued in service and repairs or renewals should be promptly made.

Tree Trimming.

Trees should be trimmed as necessary, due consideration being given clearances to meet weather conditions. Due diligence should be exercised in obtaining permission to trim trees when such permission is needed and such trimming should be done in accordance with good modern practice.

Insulation.

Insulators and insulating material used on communication and supply circuits should be designed, constructed and maintained so as to provide adequate mechanical and electrical strength.

PRACTICES APPLICABLE TO COMMUNICATION SYSTEMS

General Coordinated Methods

The following practices should be applied to all communication systems, except as deviations may be made under the principle of deferred coordination.

Power Level and Sensitivity.

The power level and sensitivity of communication circuits should be, so far as is practicable, designed and maintained at the standard recommended for the class of service involved.

Protection.

Protective devices should be such that they will not interrupt the communication circuits by operating at unnecessarily low voltages or currents.

Protective devices should be, so far as practicable, so designed, constructed and installed as not to unbalance the communication circuits.

The same type of heat coil or fuse should be used in all wires of a circuit.

Reasonable care should be used in the maintenance of all protective apparatus to avoid conditions which will unbalance or interrupt the communication circuits.

Inspections.

Adequate field inspection and routine tests of lines and apparatus should be made with a view to maintaining the electrical balance and efficiency of the circuits.

Discontinuities.

Discontinuities should be limited to the number required by the conditions.

LINES.

In order to minimize line unbalances, the resistance, inductance, capacitance and leakage conductance of one side of a circuit, in each section thereof, should be equal respectively to the corresponding quantities in the other side of the same section of the circuit in so far as is necessary and practicable.

Some of the methods and means which should be followed for the purpose of minimizing unbalance in lines are as follows:

Transpositions.

The capacitances to earth of the two sides of a telephone circuit should be suitably balanced by transpositions. Before a communication line is placed in service, a check should be made to insure that the transpositions are properly installed and correctly located.

Excessive Spacing.

Excessive spacing of conductors should be avoided. This does not mean that the spacing should be less than that required by considerations of safety, service and the future requirements of the circuits.

Derived Circuits.

In the creation of circuits from one or more circuits without adding line conductors, due regard should be given to avoiding unnecessary increases in susceptiveness.

Phantom circuits should be created only from similar adjacent pairs. Branches connected to but one side of a phantom circuit should be avoided unless connected through isolating transformers.

If one side circuit of a phantom group is loaded, the other side should be loaded at the same loading points, such loading to have closely the same electrical characteristics.

Phantom circuits should in general be used only for toll or trunk circuits except in cases of long rural circuits.

Connections.

Effort should be made to prevent the introduction of unbalance by contact resistance.

All joints in toll cables should be soldered or welded. All joints in open-wire toll conductors should be made with sleeves or should be well soldered or welded.

All wires should be properly cleaned to secure good contact before the joints are made.

All test connections, terminal boxes and associated wiring should be designed, constructed, installed and maintained so as to minimize the unbalances of the conductors.

Conductors.

Conductors of the same material and commercial size should be used in the two sides of the circuit at any point.

Ground Return Circuits.

Ground return telephone circuits should not be employed.

Use of Cable.

Consideration should be given to placing circuits in cable at the time of rebuilding heavy open wire subscribers' lines.

APPARATUS.

All apparatus electrically connected to a communication circuit should be so designed, constructed, installed and maintained as to minimize, in so far as is necessary and practicable, unbalance of the series impedance and admittance to earth of the two sides of the circuit.

Some of the methods and means which should be followed for the purpose of minimizing unbalance in equipment are as follows:

Phantom Circuit Apparatus.

Balancing resistance or other compensating apparatus should be inserted in the through side of a phantom group at the point where the other side circuit is terminated.

If one circuit of a phantom group is equipped with composite sets or composite ringers, the other side should be similarly equipped and the sets or ringers used on the two sides of the phantom group at any given point should have closely the same impedance characteristics.

Series Apparatus.

Where series apparatus, such as series condensers of a composite set is applied to toll circuits, those parts inserted in each side of a circuit should have closely the same electrical characteristics.

Coils.

Loading coils should be so designed, constructed and installed as to insert closely equal impedance in each wire of a circuit. Loading coils should be located as nearly as practicable at neutral or balanced points of the transposition system. In the design, construction, installation and maintenance of loading coils, efforts should be made to secure permanency of characteristics.

The coils employed for phantoming, compositing, simplexing or sectionalizing communication circuits should be as closely balanced as practicable. If in any case unbalanced coils are necessary, they should be isolated by properly balanced repeating coils.

The windings of retardation coils connected to the two sides of the same metallic circuit should have closely equal self-impedances. The coils of the different circuits should be equipped with suitable cases or so installed as to have negligible mutual impedances.

Condensers.

The condensers employed in composite sets, signaling devices, etc., should have adequate balance of admittance to ground.

Ringing and Signaling Equipment.

The unbalance introduced by ringing or signaling equipment should be limited, in so far as is necessary and practicable.

Central Office Circuits.

Central office circuits are to be so designed, installed and maintained that any connection between toll circuits and subscribers' circuits may be made through repeating coils.

Attention should be given to the control of unbalance in cords and central office wiring.

Effort should be made to prevent the introduction of unbalance by contact resistance.

Ground Connections.

Ground connections, if employed on equipment connected to toll circuits, should be in the balanced or neutral position of the circuit.

Specific Coordinated Methods

The specific practices outlined here are to be used in addition to the general practices to supplement the latter in so far as may be necessary and practicable in cases where communication and supply lines are involved, or are about to be involved, in inductive exposures.

All of these practices are not required to be applied in any one specific case, but in each instance that practice or those practices in combination should be selected which will under the conditions afford the best engineering solution.

Power Level and Sensitivity.

Consideration should be given to maintaining in the communication circuits as high a power level and such a degree of sensitivity as is consistent with good economics.

Selective and Other Special Devices.

Consideration should be given to the use of such devices as neutralizing transformers, sectionalizing transformers, filters, resonant shunts or drainage coils in any case where they may offer benefit and the service requirements of the circuit will permit.

Rerouting Service.

If abnormal conditions should temporarily prevent the use of a certain line and the effect of the abnormal conditions can be

avoided only by temporarily rerouting the supply or communication service over a route not involved in the inductive exposure, consideration should be given to the adoption of this expedient. Where the rerouting of either service is impracticable, the choice as to which service is to be temporarily suspended should be governed by the relative importance to the public of the respective services affected.

Records.

Routine measurements of insulation, conductor resistance, balance and induction should be made on toll circuits involved in inductive exposures and records kept of the readings.

A record should be kept of abnormal conditions in toll circuits involved in inductive exposures where a study of such conditions is advisable. Such records should as fully as practicable include time, duration, circuit designation, location, probable cause and effect of the abnormal condition and how the circuits were cleared.

All the above records or a convenient summary thereof should be available for the purpose of analyzing causes and effects of disturbances.

Lines.

Configuration.

Where service requirements permit a choice of configuration of a communication circuit or a group of communication circuits consideration should be given to the selection of a configuration such as to limit susceptiveness.

Cable.

Consideration should be given to the use of cable within an inductive exposure.

Where communication circuits are carried in aerial cable, consideration should be given to the use of properly arranged and installed grounds on cable sheaths or other methods of shielding.

Coordinated Transpositions.

Consideration should be given to the use of transpositions in supply or communication circuits, or both, within inductive exposures, for the purpose of limiting the coupling. Such transpositions should be installed at suitable intervals, the location to be

such as the local conditions demand. Where transpositions are installed in both supply and communication circuits within inductive exposures, they should be properly coordinated.

Note. Care should be taken in the installation of transpositions that, so far as practicable, the transpositions are located nearest the theoretically correct point. In determining the most economical scheme of transpositions effort should be made to utilize as many as practicable of any existing transpositions. Where the transpositions required within an inductive exposure impair the general transposition scheme of communication or supply circuits outside the limits of inductive exposure, the necessary readjustment of transpositions should be made in the section or sections of line adjacent to inductive exposure. Uniformity of separation generally assists in the attainment of coordination. If discontinuities are of sufficient magnitude to substantially affect the coupling, sections between such points should be treated independently.

Apparatus.

Party Line Ringers.

Consideration should be given to the use of high impedance substation party line ringers or their equivalent.

Central Office Equipment.

Consideration should be given to equipping toll circuits which may be switched to other toll circuits with repeating coils. In those cases where the design of a central office is such that there is a possibility that toll circuits may be switched directly to local circuits, consideration should be given to the use of repeating coils if their omission would contribute to interference.

Where series apparatus is applied to local communication circuits, consideration should be given to so arranging it that equal impedances are inserted in each side of the circuit where necessary and practicable.

Ground Connections.

Ground connections if employed on equipment connected to local communication circuits should so far as is practicable be at neutral or balanced points.

PRACTICES APPLICABLE TO SUPPLY SYSTEMS

General Coordinated Methods

The following practices should be applied to all supply systems except as deviations may be made under the principle of deferred coordination.

Residual Voltages and Currents.

Residual voltages and currents should be limited as far as is necessary and practicable.

Unsymmetrical loads between phases should be avoided in so far as is practicable where they would give rise to residual currents or voltages.

NOTE: Circuit conditions may cause a residual voltage to appear on a three-phase system. If the neutral of the system is grounded at one point, residual current may flow and the residual voltage may be increased or decreased. In this case, the residual current may consist in part of current through the total direct admittance of the system to ground due to voltages impressed between the three conductors and ground. It may also consist in part of unbalanced charging current to ground due to voltages impressed upon unbalanced direct admittances of the three conductors to ground. The former will not be affected by transpositions while the latter may be reduced or eliminated by equalization of the conductor admittances to ground.

If the system is operated without a neutral ground, the residual voltage would be reduced by equalizing the admittances of the conductors to earth.

If the phases are not symmetrically loaded and two or more neutrals of the same electrically connected system are grounded, residual currents will flow. However, substantial residual currents due to unsymmetrical loads will not flow if the system has a single or no neutral ground.

Single phase taps from 3-phase circuits have inherently a residual voltage; such taps, if long, tend to appreciably unbalance the 3-phase circuit to which they are connected.

If the neutral of a system is grounded at two or more points, the residual voltage or the residual current may be increased or decreased. Whether the total influence of the system is increased or decreased will depend upon local conditions.

Discontinuities.

Discontinuities should be limited to the number required by the conditions.

Switching.

In all switching operations care should be taken to limit, so far as is practicable, the production of transient disturbance leading to excessive momentary influence.

Care should be taken to avoid repeatedly energizing at normal voltage a transmission supply circuit in order to locate a fault. It is sometimes practicable to locate such faults by means of lower voltage testing methods.

Maintenance.

In the maintenance of supply circuits, attention should be given to the prevention of mechanical or electrical failures which would lead to residual voltages or residual currents of substantial magnitude. When supply circuits become unbalanced, due to any

cause, every reasonable effort should be made to remedy the unbalanced condition promptly.

Contact Resistance.

Care should be taken to avoid contact resistance which would affect influence.

LINES.

In order to reasonably limit the residual current and voltages arising from line unbalances, the resistance, inductance, capacitance and leakage conductance of the several conductors in each section of a circuit should, so far as is necessary and practicable, be equal respectively to the corresponding quantities in any other conductor of the same section of the circuit.

Some of the methods and means for limiting unbalance in lines are described below.

Configuration.

Where there is a choice between two or more types of configuration, consideration should be given to use where practicable of such configuration of a supply circuit or a group of supply circuits as provides the superior balance.

Excessive Spacing.

Excessive spacing of conductors should be avoided. This does not mean that the spacing should be less than required by considerations of safety, service, and the future requirement of the circuits.

Transpositions.

Capacitances to earth of the conductors of transmission supply circuits should be suitably balanced by transpositions so far as is necessary and practicable.

Branch Circuits.

Where branches employing less than the total number of phase wires are to be used, they should be so planned as not to give rise to excessive residual voltages or currents on the three-phase system.

Series Lighting Circuits.

In the construction or rearrangement of series street lighting circuits, unbalances which materially contribute to inductive influence should be avoided.

Three-Phase, Four-Wire Systems.

If three-phase, four-wire grounded neutral supply circuits are used, the neutral wire should be continuous except in case of a three-phase branch which is either operated non-grounded or is grounded only at symmetrical load points.

Ground Return Circuits.

Ground return circuits or ground return branches of multi-wire supply circuits should not be employed. This does not apply to track return circuits.

APPARATUS.

NOTE: It is recognized as commercially impossible to build rotating machinery entirely free from harmonics. It is further recognized that some distortion of wave form—and consequent introduction of harmonics—is inherent with power transformers which must employ iron in their magnetic circuits. However, in both these cases the introduction of harmonics can, to a considerable extent, be controlled within the limits of commercial design and practice. So, the above provisions are intended to secure the attention which this matter deserves because of its basic importance and its reaction on the necessity for other methods.

Rotating Machinery.

Synchronous machines should be specified and selected so as to have a wave form in which the harmonic components are limited so far as necessary and practicable.

Induction motors and generators should be selected which cause the least practicable amount of harmonic voltages and currents on the system to which they are connected.

Transformers.

In order that the wave form of voltage and current may be affected as little as practicable by transformers, such apparatus should not be designed so as to operate at excessive magnetic densities. In the installation, connection, and operation of transformers, care should be taken to avoid excessive over-voltages or excessive magnetizing currents.

When star connected transformers or autotransformers are employed with a grounded neutral on the side connected to a line circuit, low impedance closely coupled tertiary windings or delta-connected secondary windings, or other suitable means for adequately limiting the triple harmonic components of residual current or voltages should be employed.

Where open delta transformer banks are used, they should be distributed symmetrically among the phases in so far as necessary and practicable.

Care should be taken that the individual units in each grounded neutral bank of transformers connected to a transmission supply circuit are substantially alike as to electrical characteristics and that they are similarly connected.

Switches.

Each switch controlling the supply of energy to transmission supply circuits should have all poles arranged for gang operation. So far as is practicable, these switches should be automatic for short circuits between phases and from phase to ground.

Protective Apparatus.

Protective apparatus should be such that it will not unnecessarily add to transient disturbance, and should so far as practicable forestall or limit such transient disturbances.

Routine inspection of lightning arresters should be provided, and the periodic charging, where such is required, should conform to good practice.

Arresters should be maintained in good condition. Arresters which have been temporarily withdrawn from service should not be replaced in service until they are in proper operating condition.

Where lightning arresters requiring periodic charging are employed on a supply system involved in an inductive exposure, they should be equipped with auxiliary resistances and contacts.

Routine inspection or tests should be made to determine whether or not adjustments in all protective apparatus are properly maintained.

Abnormal Conditions.

Reasonable means should be provided to prevent the continuation in operation of faulty apparatus or lines for such periods or under such conditions as lead to excessive influence.

Reliable indicating or recording devices should be installed at the source of transmission supply circuits to show abnormal operating conditions.

Series Lighting Circuits.

Consideration should be given to the use of types of equipment in series street lighting circuits which, so far as practicable, have a minimum distorting effect on the voltage and current wave

shape of the lighting circuit, both during times of normal operation and times of lamp outages.

Ground Connections.

Ground connections, if employed on apparatus connected to transmission supply circuits, should be made in the balanced or neutral position in the circuit. This precludes the use of grounded open star transformer connections.

Specific Coordinated Methods

The specific practices outlined herein are to be used in addition to the general practices to supplement the latter so far as may be necessary and practicable in cases where communication and supply lines are involved, or are about to be involved, in inductive exposures.

All of these practices are not required to be applied in any one specific case, but in each instance that practice or those practices in combination should be selected which will under the conditions afford the best engineering solution.

Lines.

Configuration.

Where physical and economic conditions permit a choice of configuration of supply circuits within inductive exposures the configuration should be selected so as to limit the influence.

Branch Circuits.

Consideration should be given to the isolation of branch circuits consisting of less than the total number of wires of the main circuit, resulting in substantial balance, by means of transformers when such main or branch circuits are involved in inductive exposures.

Consideration should be given to the isolation of loops of series lighting circuits.

Coordinated Transpositions.

Consideration should be given to the use of transpositions in supply or communication circuits, or both, within inductive exposures, for the purpose of limiting the coupling. Such transpositions should be installed at suitable intervals, the location to

be such as the local conditions demand. Where transpositions are installed in both supply and communication circuits within inductive exposures, they should be properly coordinated.

NOTE: Care should be taken in the installation of transpositions that where practicable the transpositions are located nearest the theoretically correct point. In general, transpositions may be omitted at the junction points of successive sections which are suitably balanced. In determining the most economical scheme of transpositions effort should be made to utilize as many as practicable of any existing transpositions. Where the transpositions required within an inductive exposure impair the general transposition scheme of communication or supply circuits outside the limits of inductive exposure, the necessary readjustment of transpositions should be made in the section or sections of line adjacent to inductive exposure. Uniformity of separation generally assists in the attainment of coordination. If discontinuities are of sufficient magnitude to substantially affect the coupling, sections between such points should be treated independently.

Rerouting Service.

If abnormal conditions should temporarily prevent the use of a certain line and the effect of the abnormal conditions can be avoided only by temporarily rerouting the supply or communication service over circuits not involved in the inductive exposure, consideration should be given to the adoption of this expedient. Where the rerouting of either service is impracticable the choice as to which service is to be temporarily suspended should be governed by the relative importance to the public of the respective services affected.

APPARATUS.

Wave Shape.

Where a ground connection used on the armature winding of an alternating current generator or motor electrically connected to supply circuits results in triple harmonics on circuits involved in inductive exposures, means should be employed to reduce the triple harmonics as far as may be necessary and practicable.

Rectifiers, arc furnaces and other apparatus which distort the voltage or current wave form of a supply circuit involved in an inductive exposure, should be equipped when and as necessary and practicable with suitable auxiliary apparatus to prevent such distortion.

Where the service conditions permit, consideration should be given to special means and devices for reducing the amplitude of harmonics on systems involved in inductive exposures.

Reasonable efforts should be made to promptly replace outlamps on circuits equipped with individual transformers or bridged reactance coils.

Transformers.

Consideration should be given to the use of closed delta connection on main transformer supply banks or large distribution banks where necessary and practicable in preference to open delta.

Lightning Arresters.

Where, notwithstanding compliance with the paragraph regarding equipment of the arresters, interference arises at time of charging lightning arresters, charging should be done at such times as will result in minimum interference to both services.

Switches.

Consideration should be given to the installation of at least one oil-break switch, or its approved equivalent, to control the supply circuit involved in an inductive exposure.

Current Limiting Devices.

Consideration should be given to the use, so far as necessary and practicable, of current limiting devices in either the line wires or the neutral of transmission supply circuits.

Ground Connections.

Ground connections if employed on apparatus connected to local supply circuits should, so far as practicable, be made at the neutral or balanced point of the circuit.

Records.

A record should be kept of all abnormal conditions on transmission supply circuits involved in inductive exposures, where a study of such conditions is advisable. Such records should, as fully as practicable, include time and duration, circuit designation, location, probable causes and effect of abnormal conditions and how cleared.

All of the above records, or a convenient summary thereof, should be available for the purpose of analyzing cause and effect of disturbances.

DEFINITIONS

For the purpose of these principles and practices, the following terms are used with meanings as given in these definitions:

Inductive Coordination.

The location, design, construction, operation and maintenance of supply and communication systems in conformity with harmoniously adjusted methods which will prevent inductive interference.

General Coordinated Methods.

Those methods reasonably available for general application to supply or communication systems, which contribute to inductive coordination without specific consideration to the requirements for individual inductive exposures.

Specific Coordinated Methods.

Those additional methods applicable to specific situations where general coordinated methods are inadequate.

Inductive Interference.

An effect arising from the characteristics and inductive relations of supply and communication systems of such character and magnitude as would prevent the communication circuits from rendering service satisfactorily and economically if methods of inductive coordination were not applied.

Inductive Exposure.

A situation of proximity between supply and communication circuits under such conditions that inductive interference must be considered.

Inductive Susceptiveness.

Those characteristics of a communication circuit with its associated apparatus which determine, so far as such characteristics can determine, the extent to which it is capable of being adversely affected in giving service, by a given inductive field.

Inductive Influence.

Those characteristics of a supply circuit with its associated apparatus that determine the character and intensity of the inductive field which it produces.

Inductive Coupling.

The interrelation of neighboring supply and communication circuits by electric or magnetic induction or both.

Configuration.

The geometrical arrangement of the conductors of a circuit including the size of the wires and their relative positions with respect to other conductors and the earth.

Electrically Connected.

Connected by means of a conducting path or through a condenser as distinguished from connection merely through electromagnetic induction.

Transposition.

An interchange of position of conductors of a circuit between successive lengths.

Coordinated Transpositions.

Transpositions which are installed in either supply or communication circuits or in both for the purpose of reducing inductive coupling and which are located effectively with respect to the discontinuities in both the supply and communication circuits.

Discontinuity.

A point at which there is an abrupt change in the physical relations of supply and communication circuits or in electrical constants of either circuit which would materially affect the coupling.

Transpositions are not rated as discontinuities, although technically included in the definition, because of their application to coordination.

Residual Voltage.

The residual voltage of a supply circuit is the vector sum of the voltages to ground of the several wires. In a three-phase system it is in effect a single phase voltage equal to one-third of the residual voltage, impressed between the wires in multiple and the ground.

Residual Current.

The residual current of a supply circuit is the vector sum of the currents in the several wires and is equivalent to a single phase current having the wires in multiple as one side and the ground as the other.

Power Level.

The level of the electrical power flowing in a communication circuit. At any point the power level depends on the conditions of input and of losses between the point of input and the designated point.

In telephone practice the power level of a circuit is usually referred to the power level in a given circuit assuming that the acoustic input into the circuit under consideration is of a given amount and the same as the input into the reference circuit.

Sensitivity.

The sensitivity of a telephone circuit or a part thereof is the ratio of the electrical or the acoustic output to the electrical input.

Selectivity.

That property of apparatus or a circuit which permits the transmission or conversion of currents of different frequencies in differing degrees.

INDUCTIVE COORDINATION
ALLOCATION OF COSTS
BETWEEN
SUPPLY AND COMMUNICATION COMPANIES

The Reports of the Joint General Committee on Principles and Practices for Inductive Coordination have established the broad basis for the solution of inductive coordination problems from a physical standpoint based on the present state of the art. From the start, however, it has been recognized that the question of allocation of costs enters into the problem in an important way and in this connection the letter transmitting the first report contained the following statement:

> "Your Committee, as soon as standards of construction and operation are adopted, will consider whether principles can be established to aid in the fair allocation of costs of coordinative measures. In the meantime, your Committee believes that with the cooperative spirit which now is evident a mutually equitable adjustment can and should be made in each specific case. It is understood that any adjustments made will not be considered as precedents by either party to the prejudice of future understandings."

It is understood that, generally speaking, the respective utilities have been handling the allocation of costs in specific cases along the above recommended lines. However, in some cases difficulty has been encountered in endeavoring to reach an equitable adjustment; in fact, negotiations regarding the allocation of costs have in some cases unduly influenced the technical work on the specific situations involved and have tended to retard or prevent agreement on the best engineering solution.

This question has received careful consideration for some time and as a result certain suggestions have been made which will be helpful to the supply utilities and communication utilities as a guide in arriving at an equitable apportionment of the costs of

methods of inductive coordination in situations where the two utilities have not already arrived at a mutually satisfactory plan for handling the allocation of costs.

In arriving at conclusions on this matter of allocation of costs, the following were carefully considered. The solution to the problem of inductive coordination should, of course, be based on the service needs of both parties and on the overall cost rather than on any consideration of in what plant the changes shall be made or how the costs are to be allocated. This is in accordance with the section on "Choice Between Specific Methods" contained in the Principles and Practices for the Inductive Coordination of Supply and Communication Systems and it is obvious that the approach to the problem should be such as to offer every incentive to obtaining the best engineering solution. It was the consideration of these facts that suggested the method herein outlined for the allocation of costs.

As has been stated in previous reports, each party should be the judge of its own service requirements but as covered in the Principles and Practices above referred to, each party also has a duty of coordination as shown by the following quotation:

> "In order to meet the reasonable service needs of the public, all supply and communication circuits with their associated apparatus should be located, constructed, operated and maintained in conformity with general coordinated methods which maintain due regard to the prevention of interference with the rendering of either service. These methods should include limiting the inductive influence of the supply circuits or the inductive susceptiveness of the communication circuits or the inductive coupling between circuits or a combination of these, in the most convenient and economical manner."

In other words, there are certain things indicated in connection with the classes of circuits covered in the Principles and Practices above referred to which each utility should do in its system in a general way which will promote inductive coordination.

These measures, however, cannot take account of the problems which arise in specific cases, and this was also recognized in the principles on Duty of Coordination already referred to as follows:

> "Where general coordinated methods will be insufficient, such specific coordinated methods suited to the situation should be applied to the systems of either or both kinds as will most conveniently and economically prevent interference, the methods to be based on the knowledge of the art."

These specific methods cannot be embodied in the general design of either plant because their nature and the necessity of their application are contingent upon the conditions of the specific situations which may arise and which generally cannot be foreseen. It is the equitable apportionment of the cost of these latter items which has apparently given rise to such differences of opinion as have existed between representatives of the two industries on this subject.

Taking into account all the foregoing factors, the plan suggested for use in connection with new construction is as follows:

1. Each utility should at its own expense design, construct, operate and maintain its plant in accordance with general coordinated methods.

2. Specific methods of coordination should be paid for by such equitable apportionment of the costs as may be agreed to by the utilities affected. It may be found reasonable in some cases for each party to bear the costs of such specific methods of coordination as result in net capital additions in its own plant; care must be exercised, however, that this be not carried to a point where the best engineering solution is prejudiced. In cases where it is not clear as to what constitutes an equitable apportionment a fifty-fifty division of the costs may be found the most practicable solution.

3. All carrying charges, repair, operating or other current expenses incident to specific coordinated methods and all subsequent replacement costs arising after and due to the installation of specific coordinated methods should be borne by the utility on whose system the costs are incurred.

The above outlined plan has the advantage that it can in no way prejudice the application of the best engineering solution because it makes each party have a direct interest in reducing the

total cost of specific coordinated methods rather than in whether or not the expense is incurred in one plant or the other or both.

In applying this suggested general plan for the allocation of costs of specific methods of coordination, it is assumed the four following conditions will be met:

1. That each system has complied with the requirements for general coordination.
2. That the best engineering solution of the specific problem has been determined.
3. That the costs to be allocated are net costs and, therefore, exclude all items of betterment.
4. That the costs are computed on a uniform and mutually acceptable basis for both direct and indirect charges.

In situations involving extensions to existing systems or the cleaning up of existing exposures it is recognized that such existing systems may not comply entirely with general coordinated methods, and that the method suggested above for new construction may require some modification to adapt it to existing situations. Such problems involve consideration of whether or not both systems should be brought into compliance with general coordinated methods or whether some other plan is the best engineering solution. This point, together with the history of the case and any contemplated plans either party may have for changes in its system, will have a bearing on what constitutes an equitable apportionment of the costs.

PRINCIPLES AND PRACTICES FOR THE JOINT USE OF WOOD POLES BY SUPPLY AND COMMUNICATION COMPANIES

INTRODUCTORY

These Principles and Practices cover the general engineering and operating features involved in the joint use of wood poles and are intended to be in conformity with the broad principles heretofore mutually agreed upon by the Joint General Committee.

The Principles set forth in a broad and general manner the basic fundamentals involved in the intercompany relationships on joint use of poles. The two groups of utilities recognize their responsibility to serve the public safely, adequately and economically. It is therefore essential that any arrangement entered into be such as to best facilitate the present and future rendering of both classes of service.

Practices are recommendations which cover in a more specific way the general ground included in the Principles and are based on an analysis of practical operating experience with joint use of poles. It is recommended that they be used as a guide in the preparation of new agreements for the joint use of poles and in the modification of existing agreements where it is desired by either party to bring such existing agreements into conformity with these Principles and Practices.

PRINCIPLES

1. Duties.

Each party should:

(a) Be the judge of the quality and requirements of its own service, including the character and design of its own facilities.

(b) Provide and maintain facilities adequate to meet the service requirements including such future modifications in these facilities as changing conditions indicate to be necessary and proper.

(c) Determine the character of its own circuits and structures to be placed or continued in joint use, and determine the character of the circuits and structures of others with which it will enter into or continue in joint use.

(d) Cooperate with the other party so that in carrying out the foregoing duties, proper consideration will be given to the mutual problems which may arise and so that the parties can jointly determine the best engineering solution in situations where the facilities of both are involved.

2. Establishing, Maintaining and Terminating Joint Use.

Joint consideration by both parties of safety, service, economy, convenience and the trend toward higher distribution voltages should determine:

(a) When joint use should be employed, taking into account present conditions and those which can be reasonably foreseen, including the possibility of reverting to separate lines.

(b) The best engineering solution for the coordinated arrangement and design of facilities in joint use.

(c) The administrative methods for entering into, carrying on and terminating joint use.

3. Local Contact.

All parties at interest in a locality should maintain close cooperation and each notify the others of any intent to build new lines or to reconstruct existing lines, as an aid to orderly planning and the utilization of joint use where advantageous.

4. Contracts.

General contracts for joint use, if entered into, should define conditions for entering into joint use, for operating in joint use, for terminating joint use and for a practical procedure for modifying facilities in joint use from time to time.

In either general or specific contracts, any provisions treating of the character of circuits on poles for joint use should be so drawn as not to restrict changes in the character of the circuits of either party, except that it should be recognized that such changes may involve the modification or abandonment of joint use in specific cases.

Each specific instance of contemplated initial or modified joint use, whether embracing a single pole, a group of poles or an entire line, should be considered, as to acceptance, as a separate and distinct case, with the right of refusal by either party, and if accepted should be in writing.

Joint use now exists and gives satisfaction in many localities under one of two general plans, one a "Space Rental Plan" and the other a "Joint Ownership Plan." In addition, joint use is sometimes effected on an "Attachment" or "Contact Rental" basis, and sometimes under a "Permanent Rights" agreement, which is a modification of the "Joint Ownership Plan." The Joint Ownership Plan and the Space Rental Plan have in general proved the more simple and convenient working arrangements.

5. Costs.

The allocation of costs between the parties at interest should be prima facia, reasonable and equitable, taking into account all factors involved.

6. Legal Considerations.

Legal questions, including the sufficiency of right-of-way grants held by the parties and the protection of title or property of both parties in the case of mortgages, sales, mergers or consolidations entered into by either party should be given due consideration in the preparation of contracts.

In any terms of the contract dealing with liability for personal or property damage, care should be taken that such terms are not disadvantageous to either party.

7. Periodical Readjustment of Contracts.

Provision should be made for review and revision from time to time of those stipulations of a contract treating of conditions of a varying nature and particularly of items of expense to be apportioned between the parties, such as the cost of poles and rentals which are dependent on material and labor prices.

8. Construction and Inductive Coordination.

The construction and inductive coordination employed in joint use should be in accordance with mutually acceptable practices and in conformity with such recommendations of the Joint General Committee as are issued from time to time.

PRACTICES

1. Territory Covered by Agreement.

Agreements should preferably cover all existing wood poles of each of the parties and any other wood poles hereafter erected or acquired by either of them within a certain described territory, except those which carry circuits of a character that the parties wish to keep out of joint use.

NOTE: It is recognized that there are exceptional situations where it may not be desirable to make general agreements covering a given territory, as, for example, where the major portion of the poles of one of the parties carry circuits for which joint use is not generally advantageous. Such cases may be more satisfactorily handled by agreements covering a specific line or certain specific poles.

2. Types of Joint Use Agreements.

Joint use agreement should preferably be of a type under which each of the parties shares equitably in the cost of joint poles. This may be accomplished in either of the following ways:

(a) Space rental under which form of agreement the licensee rents space on the pole of the Owner and pays a rental per pole which is based on the amount of space reserved. A much used form of this is the so called "flat rental per pole" where the division is practically equal and the rental is approximately equal to one-half the average annual charges on a pole which is stipulated as the standard of reference.

(b) Joint ownership, under which form of agreement each of the parties owns a half interest in each joint pole and pays one-half the cost in place of the pole which is stipulated as the standard of reference.

NOTE: A permanent rights agreement is a modification of the joint ownership agreement which has been used occasionally under which each of the parties retains sole ownership of certain of the poles and the other party purchases a permanent right of occupancy. The other arrangements are the same as in a joint ownership agreement.

Rentals based on individual contacts or attachments are not generally recommended for joint pole agreements, as such a basis involves the expense and obligations arising from periodical inventories of the attachments. It is also difficult to establish rental rates for the many kinds of individual attachments which will continue to be equitable and mutually satisfactory. Furthermore, this basis does not have the advantage of providing a suitable space for the present and future requirements of each party. However, such a basis may sometimes be found satisfactory for an individual agreement where only a small number of poles is involved.

3. Conditions Relating to Joint Use of Poles.

It is recognized that there are very substantial advantages to both utilities in the employment of jointly occupied poles where the conditions and character of circuits permit. The conditions determining the necessity or desirability of joint use depends upon the service requirements to be met by both parties including considerations of safety and economy. Each party is the judge of what the character of its circuits should be to meet its service requirements and as to whether or not these service requirements can be properly met by the joint use of poles.

(a) It is recommended that joint use should be entered into in preference to separate pole lines on the same street or highway where the combination of circuits is such as to make further cooperative study of the problem unnecessary and in other cases where a cooperative study shows that joint use is economical and is the best engineering solution.

(b) Each party should retain the right to remain out of joint use with such of its pole lines as are necessary for its own sole use or in other cases where in its judgment the proper rendering of its service now or in the future requires separate lines.

(c) It is recognized that joint use is advisable but that it is necessary that when employed it should meet the service requirements of both parties and that any statement made as to conditions under which joint use is desirable is likely to change as time goes on and as service conditions and the state of the art change.

(d) Based upon the present state of the art, the Supply Utilities and the Communication Utilities have stated as to their respective circuits (See appendices 1 and 2) the present limitations within which each group recommends that joint use be entered into.

(e) In any case where it is necessary that the two kinds of lines occupy the same side of the highway joint use is generally preferable to overbuilding.

(f) It is recognized that situations will sometimes arise in rural districts where greater economy can be obtained with separate lines than with a joint line and without sacrificing safety or service. It is also recognized that a utility will find in some cases that it is necessary to construct a line which is to carry such number and weight of attachments that joint use would not be economical or desirable. In such cases it is not intended to recommend joint use of poles in preference to other arrangements which would be more advantageous.

4. Cooperation to Establish Joint Use.

(a) When any party to a joint use agreement is about to erect a new pole line or to extend or reconstruct an existing pole line within the territory covered by the agreement, notice in advance should be given to the other party to the agreement, such notice showing the proposed location and character of the new poles. The parties should then cooperate to determine whether or not joint use of the poles should be established.

(b) When any party to a joint use agreement desires to occupy space on any existing poles of the other party within the territory covered by the agreement, notice should be given the owner of said poles and the parties should then cooperate to determine whether or not joint use of poles should be established.

5. Avoidance of Conflicting Lines.

Where joint use of poles is not to be established or where in accordance with Section 6 of these Practices joint use is to be terminated, the parties should make every reasonable effort to avoid the establishment of conflicting lines.

6. Procedure When Character of Circuits Is Changed.

When either party desires to change the character of its circuits on jointly used poles it shall so notify the other party and the parties shall cooperate to determine whether or not joint use of the poles involved shall be continued. If it is not agreed to continue joint use of the said poles, the parties shall then cooperate to determine the most practical and economical method of effectively providing for separate lines. The party whose circuits are to be moved shall promptly carry out the necessary work and the parties shall cooperate to determine the equitable apportionment of the net expense involved in such relocation. In the event of a disagreement as to what constitutes an equitable apportionment of such expense the following arrangements are recommended:

(a) In the case of a space rental agreement, the licensee shall bear the said net expense.

(b) In the case of a joint ownership agreement the said net expense shall be divided equally between the parties.

Unless otherwise agreed by the parties, ownership of any new line constructed under the foregoing provision in a new location shall rest in the party for whose use it is constructed. The net cost of establishing service in the new location should be exclusive of any increased cost due to the substitution for the existing facilities of other facilities of a substantially new or improved type or of increased capacity, but should include the new pole line, the cost of removing attachments from the old poles to the new location and the cost of placing the attachments on the poles in the new location.

7. Ownership of Poles Under a Space Rental Agreement.

In any case where the parties to a space rental agreement shall conclude arrangements for the joint use of any new poles to be erected, the ownership of such new poles should be determined by mutual agreement. In case of failure to agree, the party then owning the smaller number of joint poles under the agreement should erect the poles and be the owner thereof.

NOTE: It has been found to be of advantage under this form of agreement to have each party own approximately one-half the total number of jointly used poles, as this tends to equalize the investment of the two parties. Furthermore, this has the advantage of reducing the intercompany billing and the exchange of money between the parties. This division of ownership should preferably be accomplished by each party owning certain continuous lines rather than having the ownership of the poles in a given line divided.

8. Joint Fundamental Plan.

An effective way of handling the proper development of joint pole lines in a given territory is through the full application of the principles on cooperation including advance notice, advance planning and the interchange of information. Experience has shown that this can be accomplished through a joint fundamental plan of the present and future developments of the overhead systems of the respective parties. Through such joint planning it will be generally found possible to avoid any difficult situations in locating the lines and the application of these Principles and Practices to both the present and future developments can be carried out in the most effective and economical manner.

9. Specifications for Joint Pole Construction.

It is intended that complete specifications covering recommended practices for joint use of poles under various conditions will be prepared as soon as practicable. Until such time as these specifications are issued, it is recommended that the National Electrical Safety Code be used as a guide to practice.

Existing joint pole construction should be brought into conformity with the recommended practices in an orderly and systematic manner. This may be accomplished by a provision in the agreement that a certain percentage of the existing construction be brought into conformity with the recommended practices each year.

10. Inductive Coordination for Circuits on Jointly Used Poles.

The "Principles and Practices for the Inductive Coordination of Supply and Communication Systems" as issued from time to time by the Joint General Committee should be followed.

APPENDIX 1

Supply Utilities Statement.

In the present state of the art and subject to the limitations of the Principles and Practices of which this is an appendix, the Supply Utilities are willing to enter into joint use of poles generally, irrespective of the character of the Communication Utilities circuits with the clear understanding that these Principles and Practices do not limit such changes to higher voltages as may be desirable in the future as the most advantageous means of serving their customers but provide for such changes in location or construction as may be necessary to meet the changed conditions.